



DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2023-0163; Project Identifier AD-2022-01380-T]

RIN 2120-AA64

Airworthiness Directives; The Boeing Company Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The FAA proposes to supersede Airworthiness Directive (AD) 2022-02-16, which applies to all The Boeing Company Model 787-8, 787-9, and 787-10 airplanes. AD 2022-02-16 requires revising the limitations and operating procedures sections of the existing airplane flight manual (AFM) to incorporate limitations prohibiting certain landings and the use of certain minimum equipment list (MEL) items, and to incorporate operating procedures for calculating landing distances, when in the presence of 5G C-Band interference as identified by Notices to Air Missions (NOTAMs). Since the FAA issued AD 2022-02-16, the FAA determined that additional limitations are needed due to the continued deployment of new 5G C-Band base stations whose signals are expected to cover most of the contiguous United States at transmission frequencies between 3.7-3.98 GHz. This proposed AD would require revising the limitations section of the existing AFM to incorporate limitations prohibiting certain landings and the use of certain MEL items, and would retain the operating procedures from AD 2022-02-16 for calculating landing distances, due to the presence of 5G C-Band interference. The FAA is proposing this AD to address the unsafe condition on these products.

DATES: The FAA must receive comments on this proposed AD by [INSERT DATE 20 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

- Federal eRulemaking Portal: Go to [regulations.gov](https://www.regulations.gov). Follow the instructions for submitting comments.

- Fax: 202-493-2251.

- Mail: U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.

- Hand Delivery: Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

AD Docket: You may examine the AD docket at [regulations.gov](https://www.regulations.gov) under Docket No. FAA-2023-0163; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this NPRM, any comments received, and other information. The street address for Docket Operations is listed above.

FOR FURTHER INFORMATION CONTACT: Brett Portwood, Continued Operational Safety Technical Advisor, COS Program Management Section, Operational Safety Branch, FAA, 3960 Paramount Boulevard, Lakewood, CA 90712-4137; phone: 817-222-5390; email: operationalsafety@faa.gov.

SUPPLEMENTARY INFORMATION:

Comments Invited

The FAA invites you to send any written relevant data, views, or arguments about this proposal. Send your comments to an address listed under ADDRESSES. Include “Docket No. FAA-2023-0163; Project Identifier AD-2022-01380-T” at the beginning of your comments. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. The FAA

will consider all comments received by the closing date and may amend the proposal because of those comments.

Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will post all comments received, without change, to [regulations.gov](https://www.regulations.gov), including any personal information you provide. The agency will also post a report summarizing each substantive verbal contact received about this proposed AD.

Confidential Business Information

CBI is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this NPRM contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this NPRM, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as “PROPIN.” The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this NPRM. Submissions containing CBI should be sent to Brett Portwood, Continued Operational Safety Technical Advisor, COS Program Management Section, Operational Safety Branch, FAA, 3960 Paramount Boulevard, Lakewood, CA 90712-4137; phone: 817-222-5390; email: operationalsafety@faa.gov. Any commentary that the FAA receives that is not specifically designated as CBI will be placed in the public docket for this rulemaking.

Background

The FAA issued AD 2021-23-12, Amendment 39-21810 (86 FR 69984, December 9, 2021) (AD 2021-23-12), for all transport and commuter category airplanes equipped with a radio altimeter. AD 2021-23-12 was prompted by a determination that

radio altimeters cannot be relied upon to perform their intended function if they experience interference from wireless broadband operations in the 3.7-3.98 GHz frequency band (5G C-Band). AD 2021-23-12 requires revising the limitations section of the existing AFM to incorporate limitations prohibiting certain operations requiring radio altimeter data when in the presence of 5G C-Band interference as identified by NOTAMs. The agency issued AD 2021-23-12 because radio altimeter anomalies that are undetected by the automation or pilot, particularly close to the ground (e.g., landing flare), could lead to loss of continued safe flight and landing.

The FAA subsequently identified an additional hazard presented by 5G C-Band interference on The Boeing Company Model 787-8, 787-9, and 787-10 airplanes and issued AD 2022-02-16, Amendment 39-21913 (87 FR 2692, January 19, 2022) (AD 2022-02-16). AD 2022-02-16 was prompted by a determination that, during landings, as a result of 5G C-Band interference, certain airplane systems may not properly transition from AIR to GROUND mode when landing on certain runways, resulting in degraded deceleration performance and longer landing distance than normal due to the effect on thrust reverser deployment, speedbrake deployment, and increased idle thrust. AD 2022-02-16 mandates procedures for operators to account for this longer landing distance, for all runway conditions, when in the presence of 5G C-Band interference as identified by NOTAM. AD 2022-02-16 prohibits operators from dispatching or releasing airplanes to affected airports when certain braking and anti-skid functions on the airplane are inoperable. It also prohibits operators from dispatching or releasing airplanes to, or landing on, runways with condition codes 1 (ice) and 0 (wet ice, water on top of compacted snow, dry snow, or wet snow over ice). The agency issued AD 2022-02-16 to address degraded deceleration performance and longer landing distance, which could lead to a runway excursion.

Actions Since AD 2022-02-16 Was Issued

Since issuing AD 2022-02-16, the FAA determined that additional limitations are needed due to the continued deployment of new 5G C-Band base stations whose signals are expected to cover most of the contiguous United States at transmission frequencies between 3.7-3.98 GHz. Therefore, the FAA issued an NPRM, Docket No. FAA-2022-1647 (88 FR 1520, January 11, 2023) (the NPRM), proposing to supersede AD 2021-23-12. In the NPRM, the FAA proposed to retain most of the operational prohibitions required by AD 2021-23-12 until June 30, 2023; on or before June 30, 2023, operators would be required to revise their existing AFM to prohibit these operations unless the airplane has a radio altimeter meeting proposed minimum performance levels (a defined power spectral density (PSD) curve as well as a defined aggregate spurious emission level) and is operating at a 5G C-Band mitigated airport (5G CMA). In the NPRM, the FAA also proposed to require all airplanes operating under 14 CFR part 121 to have a radio altimeter meeting the proposed minimum performance standards by February 1, 2024.

Since the NPRM was published, the FAA has determined that a PSD curve is a more appropriate method to define performance than a single fixed emission level. The proposed PSD curve more accurately reflects differences in radio altimeter susceptibility to interfering emissions at different altitude levels. The FAA plans to issue guidance on how to show compliance with both the fundamental PSD curve and spurious PSD curve, including the data to be submitted, for the FAA to approve the method used.

AD 2022-02-16 relies on the FAA's use of NOTAMs to identify 5G C-band interference at certain airports in the U.S. airspace. As explained in more detail in the NPRM, those NOTAMs are no longer the best means of communicating the location of the 5G C-Band environment. Therefore, this proposed AD would retain the AFM limitations required by AD 2022-02-16 until June 30, 2023. On or before June 30, 2023,

this proposed AD would require operators to replace the limitations with limitations prohibiting the same operations, except the prohibitions would not be tied to NOTAMs but instead would depend on whether the airplane is operated at a 5G CMA as identified by an FAA Domestic Notice. Because the 5G C-Band Interference operating procedure required by AD 2022-02-16 does not reference NOTAMs, this proposed AD would retain that operating procedure requirement with no change.

FAA's Determination

The FAA is issuing this NPRM after determining that the unsafe condition described previously is likely to exist or develop on other products of the same type design.

Proposed AD Requirements in this NPRM

This proposed AD would retain the AFM revisions required by AD 2022-02-16 until June 30, 2023. On or before June 30, 2023, this proposed AD would require replacing those AFM revisions with limitations prohibiting the same landings and use of certain MEL items at all airports for non-radio altimeter tolerant airplanes. For radio altimeter tolerant airplanes, the prohibited operations would be allowed at 5G CMAs as identified in an FAA Domestic Notice. The minimum performance levels in this proposed AD for determining whether an airplane is radio altimeter tolerant are the same minimum performance levels proposed in the NPRM, except the FAA has replaced the proposed fixed emission level with a proposed PSD curve emission threshold that more accurately reflects differences in radio altimeter susceptibility to interfering emissions at different altitude levels.

Paragraph (k)(3) of this proposed AD specifies that AMOCs approved for AD 2021-23-12 providing relief for specific radio altimeter installations would be approved as AMOCs for the requirements specified in paragraph (h) of this proposed AD until June 30, 2023. After June 30, 2023, operators with AMOCs approved for AD 2021-

23-12 would be required to incorporate the 5G C-Band Interference operating procedure specified in paragraph (h)(2) of this proposed AD. The new AFM limitations, which would be required by paragraph (i) or (j) of this proposed AD, specify that operators must comply with this 5G C-Band Interference operating procedure.

Interim Action

The FAA considers that this AD, if adopted as proposed, would be an interim action. Once the Technical Standard Order (TSO) standard for radio altimeters is established, which will follow the existing international technical consensus on the establishment of the minimum operational performance standards (MOPS), the FAA anticipates that the MOPS will be incorporated into the TSO. The FAA also anticipates that aircraft incorporating equipment approved under the new Radio Altimeter TSO will be able to operate in both 5G CMAs and non-5G CMAs with no 5G C-Band-related AFM limitations. Once a new radio altimeter TSO is developed, approved, and available, the FAA might consider additional rulemaking.

Costs of Compliance

The cost information below describes the costs to change the AFM. Although this proposed AD would largely maintain the AFM limitations currently required by AD 2022-02-16, the FAA acknowledges that this proposed AD may also impose costs on some aircraft operators from having to change their conduct to comply with the amended AFM. However, the FAA lacks the data necessary to quantify the costs associated with aircraft operators changing their conduct. The FAA is seeking public comment on these costs so the agency can more fully account for the impact of this regulatory action.

The FAA estimates that this AD, if adopted as proposed, would affect 145 airplanes of U.S. registry.¹ The FAA estimates the following costs to comply with this proposed AD:

Estimated costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
AFM revision (retained action from AD 2022-02-16)	1 work-hour X \$85 per hour ² = \$85	\$0	\$85	\$12,325
New AFM revision (new proposed action)	1 work-hour X \$85 per hour = \$85	\$0	\$85	\$12,325 ³

Authority for this Rulemaking

Title 49 of the United States Code specifies the FAA’s authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the Agency’s authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

¹ This is the number of Boeing Model 787-8, 787-9, and 787-10 airplanes on the FAA’s registry as of December 1, 2022.

² The labor rate of \$85 per hour is the average wage rate for an aviation mechanic.

³ The estimated cost for this revision would not constitute a significant economic impact (even for small entities) because \$85 is a minimal cost compared to the regular costs of maintaining and operating a Model 787-8, 787-9, or 787-10 transport category airplane.

Regulatory Findings

The FAA has determined that this proposed AD would not have federalism implications under Executive Order 13132. This proposed AD would not have a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that the proposed regulation:

- (1) Is not a “significant regulatory action” under Executive Order 12866,
- (2) Would not affect intrastate aviation in Alaska, and
- (3) Would not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

The Proposed Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA proposes to amend 14 CFR part 39 as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

- 1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

- 2. The FAA amends § 39.13 by:

- a. Removing Airworthiness Directive (AD) 2022-02-16, Amendment 39-21913 (87 FR 2692, January 19, 2022), and

- b. Adding the following new AD:

The Boeing Company Airplanes: Docket No. FAA-2023-0163; Project Identifier AD-2022-01380-T.

(a) Comments Due Date

The FAA must receive comments on this airworthiness directive (AD) by [INSERT DATE 20 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

(b) Affected ADs

This AD replaces AD 2022-02-16, Amendment 39-21913 (87 FR 2692, January 19, 2022) (AD 2022-02-16).

(c) Applicability

This AD applies to all The Boeing Company Model 787-8, 787-9, and 787-10 airplanes, certificated in any category.

(d) Subject

Air Transport Association (ATA) of America Code 34, Navigation.

(e) Unsafe Condition

This AD was prompted by a determination that radio altimeters cannot be relied upon to perform their intended function if they experience interference from wireless broadband operations in the 3.7-3.98 GHz frequency band (5G C-Band), and a determination that, during landings, as a result of this interference, certain airplane systems may not properly transition from AIR to GROUND mode when landing on certain runways, resulting in a longer landing distance than normal due to the effect on thrust reverser deployment, speedbrake deployment, and increased idle thrust. The FAA is issuing this AD to address degraded deceleration performance and longer landing distance, which could lead to a runway excursion.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

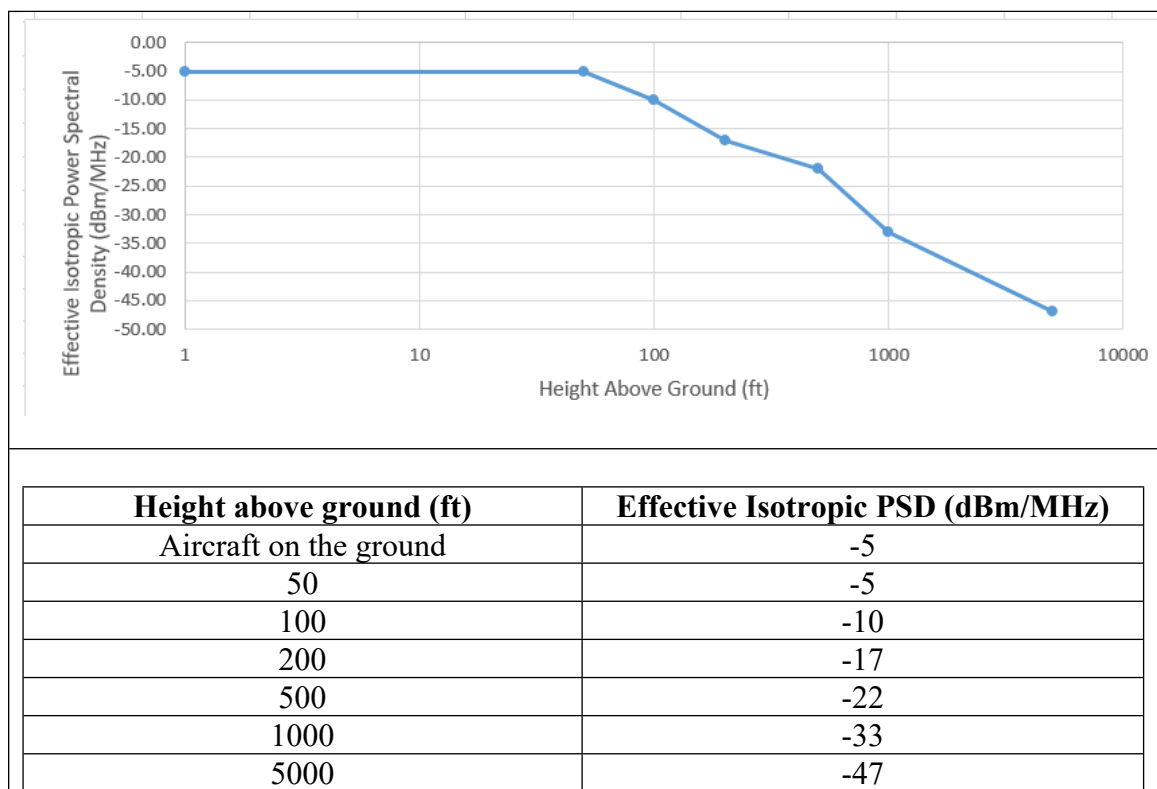
(g) Definitions

(1) For purposes of this AD, a “5G C-Band mitigated airport” (5G CMA) is an airport at which the telecommunications companies have agreed to voluntarily limit their 5G deployment at the request of the FAA, as identified by an FAA Domestic Notice.

(2) For purposes of this AD, a “radio altimeter tolerant airplane” is one for which the radio altimeter, as installed, demonstrates the tolerances specified in paragraphs (g)(2)(i) and (ii) of this AD, using a method approved by the FAA.

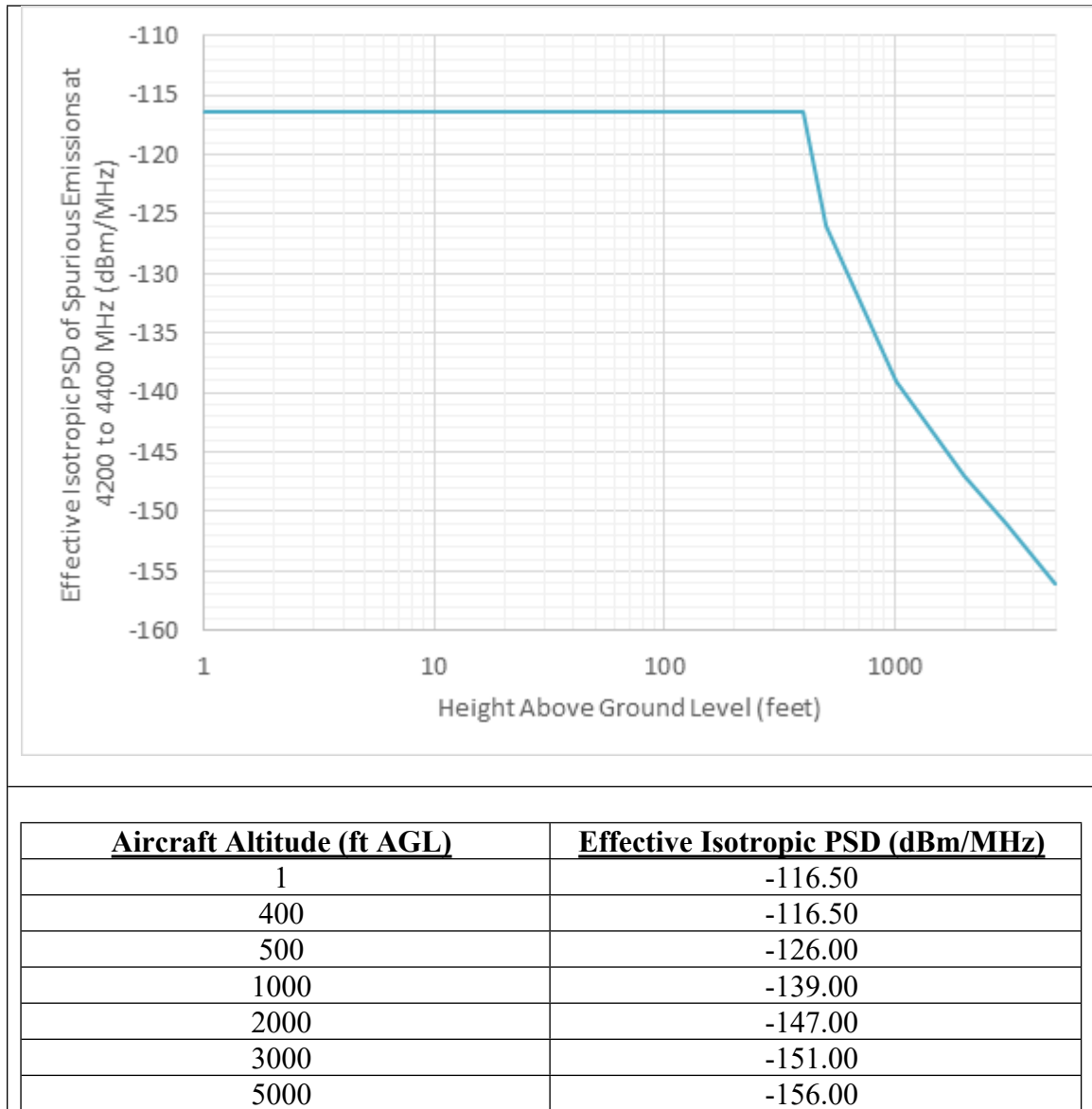
(i) Tolerance to radio altimeter interference, for the fundamental emissions (3.7-3.98 GHz), at or above the power spectral density (PSD) curve threshold specified in figure 1 to paragraph (g)(2)(i) of this AD.

Figure 1 to paragraph (g)(2)(i) – Fundamental Effective Isotropic PSD at Outside Interface of Aircraft Antenna



(ii) Tolerance to radio altimeter interference, for the spurious emissions (4.2-4.4 GHz), at or above the PSD curve threshold specified in figure 2 to paragraph (g)(2)(ii) of this AD.

Figure 2 to paragraph (g)(2)(ii) – Spurious Effective Isotropic PSD at Outside Interface of Aircraft Antenna



(3) For purposes of this AD, a “non-radio altimeter tolerant airplane” is one for which the radio altimeter, as installed, does not demonstrate the tolerances specified in paragraphs (g)(2)(i) and (ii) of this AD.

(4) Runway condition codes are defined in figure 3 to paragraph (g)(4) of this AD.

Figure 3 to paragraph (g)(4) – Runway Condition Codes

Runway Condition Code	Runway Condition Description	Reported Braking Action
6	Dry	Dry
5	Wet (smooth, grooved, or porous friction course (PFC)) or frost 3 mm (0.12 inch) or less of: water, slush, dry snow, or wet snow	Good
4	Compacted snow at or below -15°C (5°F) outside air temperature (OAT)	Good to medium
3	Wet (slippery), dry snow, or wet snow (any depth) over compacted snow Greater than 3 mm (0.12 inch) of: dry snow or wet snow Compacted snow at OAT warmer than -15°C (5°F)	Medium
2	Greater than 3 mm (0.12 inch) of: water or slush	Medium to poor
1	Ice	Poor
0	Wet ice, water on top of compacted snow, dry snow, or wet snow over ice	Nil

(h) Retained Airplane Flight Manual (AFM) Revision

This paragraph restates the requirements of paragraph (h) of AD 2022-02-16.

(1) Within 2 days after January 19, 2022 (the effective date of AD 2022-02-16):

Revise the Limitations Section of the existing AFM to include the information specified in figure 4 to paragraph (h)(1) of this AD. This may be done by inserting a copy of figure 4 to paragraph (h)(1) of this AD into the existing AFM.

Figure 4 to paragraph (h)(1) – AFM Limitations Revisions

(Required by AD 2022-02-16)

Radio Altimeter 5G C-Band Interference, Landing Distance

The following limitations are required if dispatching or releasing to or landing on runways in U.S. airspace in the presence of 5G C-Band wireless broadband interference as identified by NOTAM (NOTAMs will be issued to state the specific airports or approaches where the radio altimeter is unreliable due to the presence of 5G C-Band wireless broadband interference).

Minimum Equipment List (MEL)

Dispatch or release with any of the following MEL items is prohibited:

- 32-42-02 – Antiskid Control Systems
- 32-45-01 – Wheel Brake Systems
- 32-45-01-01 – Wheel Brake Systems, Electric Brake Actuator Systems

Landing Operations on Runways with Condition Code 1 or 0

Dispatch or releasing to or landing on runways with a runway condition code of 1 or 0 is prohibited.

Landing Distance Calculations for Runway Condition Codes 6 through 2

Operators must follow the 5G C-Band Interference Landing Distance Procedure contained in the Operating Procedures Section of this AFM.

(2) Within 2 days after January 19, 2022 (the effective date of AD 2022-02-16):

Revise the Operating Procedures Section of the existing AFM to include the information specified in figure 5 to paragraph (h)(2) of this AD. This may be done by inserting a copy of figure 5 to paragraph (h)(2) of this AD into the existing AFM.

Figure 5 to paragraph (h)(2) – AFM Operating Procedures Revision

5G C-Band Interference Landing Distance

When dispatching or releasing to or landing on runways with a runway condition code of 6 through 2:

- Dispatch or Release:
 - No additional landing distance calculations are required for runway condition codes 6 and 5.
 - For runway condition codes 4 through 2, use Table 1 through 6, as applicable, to determine the unfactored landing distance, applying all adjustments. Multiply the resulting unfactored landing distance by 1.15 to obtain the minimum required landing distance.

Table 1:

787-10 / TRENT 1000									
Landing Distances and Adjustments (Feet)									
Runway Condition Code	Reference Distance	Weight Adjustment	Altitude Adjustment	Wind Adjustment per 10 Knots	Slope Adjustment per 1%	Temperature Adjustment per 10°C	Approach Speed Adjustment	Reverse Thrust Adjustment	
	440,000 LB Landing Weight	Per 10,000 LB Above / Below 440,000 LB	Per 1,000 ft	Head / Tail Wind	Down / Up Hill	Above / Below ISA	per 5 KTS above VREF	One Reverser	No Reverser
6	5640	110 / -90	160	-240 / 790	90 / -80	150 / -150	230	0	0
5	7680	170 / -150	330	-430 / 1570	250 / -210	280 / -270	390	0	0
4	8450	170 / -150	340	-450 / 1610	330 / -270	280 / -280	390	0	0
3	9180	170 / -150	340	-470 / 1680	440 / -340	290 / -280	390	0	0
2	12180	280 / -250	560	-770 / 2850	970 / -690	480 / -460	540	0	0

Table 2:

787-10 / GEnx									
Landing Distances and Adjustments (Feet)									
Runway Condition Code	Reference Distance	Weight Adjustment	Altitude Adjustment	Wind Adjustment per 10 Knots	Slope Adjustment per 1%	Temperature Adjustment per 10°C	Approach Speed Adjustment	Reverse Thrust Adjustment	
	440,000 LB Landing Weight	Per 10,000 LB Above / Below 440,000 LB	Per 1,000 ft	Head / Tail Wind	Down / Up Hill	Above / Below ISA	per 5 KTS above VREF	One Reverser	No Reverser
6	5670	110 / -90	170	-240 / 800	90 / -80	150 / -150	230	0	0
5	7760	160 / -150	350	-440 / 1590	260 / -220	280 / -280	400	0	0
4	8550	160 / -150	350	-450 / 1640	340 / -280	290 / -280	400	0	0
3	9300	170 / -150	360	-480 / 1710	450 / -350	290 / -290	400	0	0
2	12400	280 / -250	610	-790 / 2930	1010 / -710	480 / -470	540	0	0

Table 3:

787-9 / TRENT 1000									
Landing Distances and Adjustments (Feet)									
Runway Condition Code	Reference Distance	Weight Adjustment	Altitude Adjustment	Wind Adjustment per 10 Knots	Slope Adjustment per 1%	Temperature Adjustment per 10°C	Approach Speed Adjustment	Reverse Thrust Adjustment	
	420,000 LB Landing Weight	Per 10,000 LB Above / Below 420,000 LB	Per 1,000 ft	Head / Tail Wind	Down / Up Hill	Above / Below ISA	per 5 KTS above VREF	One Reverser	No Reverser
6	5470	100 / -90	160	-240 / 780	80 / -80	150 / -150	230	0	0
5	7500	160 / -150	330	-430 / 1550	250 / -210	280 / -270	390	0	0
4	8280	160 / -150	330	-440 / 1600	330 / -270	280 / -270	390	0	0
3	9010	170 / -160	340	-470 / 1670	430 / -340	290 / -280	390	0	0
2	11740	270 / -260	540	-750 / 2780	910 / -650	460 / -440	530	0	0

Table 4:

787-9 / GENx									
Landing Distances and Adjustments (Feet)									
Runway Condition Code	Reference Distance	Weight Adjustment	Altitude Adjustment	Wind Adjustment per 10 Knots	Slope Adjustment per 1%	Temperature Adjustment per 10°C	Approach Speed Adjustment	Reverse Thrust Adjustment	
	420,000 LB Landing Weight	Per 10,000 LB Above / Below 420,000 LB	Per 1,000 ft	Head / Tail Wind	Down / Up Hill	Above / Below ISA	per 5 KTS above VREF	One Reverser	No Reverser
6	5500	100 / -90	170	-240 / 790	90 / -80	150 / -150	230	0	0
5	7580	160 / -150	340	-430 / 1580	250 / -210	280 / -280	390	0	0
4	8380	160 / -150	350	-450 / 1630	340 / -280	280 / -280	390	0	0
3	9130	170 / -150	360	-480 / 1700	450 / -350	290 / -280	390	0	0
2	11960	270 / -260	590	-770 / 2860	940 / -670	460 / -460	530	0	0

Table 5:

787-8 / TRENT 1000									
Landing Distances and Adjustments (Feet)									
Runway Condition Code	Reference Distance	Weight Adjustment	Altitude Adjustment	Wind Adjustment per 10 Knots	Slope Adjustment per 1%	Temperature Adjustment per 10°C	Approach Speed Adjustment	Reverse Thrust Adjustment	
	380,000 LB Landing Weight	Per 10,000 LB Above / Below 380,000 LB	Per 1,000 ft	Head / Tail Wind	Down / Up Hill	Above / Below ISA	per 5 KTS above VREF	One Reverser	No Reverser
6	5050	110 / -80	150	-230 / 750	80 / -70	130 / -130	220	0	0
5	6990	180 / -140	310	-410 / 1510	230 / -190	260 / -250	370	0	0
4	7410	140 / -130	250	-370 / 1270	280 / -230	210 / -210	310	0	0
3	8370	170 / -150	290	-440 / 1500	410 / -320	250 / -250	340	0	0
2	10800	290 / -240	520	-720 / 2680	820 / -590	430 / -420	510	0	0

Table 6:

787-8 / GENx									
Landing Distances and Adjustments (Feet)									
Runway Condition Code	Reference Distance	Weight Adjustment	Altitude Adjustment	Wind Adjustment per 10 Knots	Slope Adjustment per 1%	Temperature Adjustment per 10°C	Approach Speed Adjustment	Reverse Thrust Adjustment	
	380,000 LB Landing Weight	Per 10,000 LB Above / Below 380,000 LB	Per 1,000 ft	Head / Tail Wind	Down / Up Hill	Above / Below ISA	per 5 KTS above VREF	One Reverser	No Reverser
6	5100	110 / -80	160	-230 / 760	80 / -70	130 / -140	220	0	0
5	7100	180 / -140	330	-420 / 1550	240 / -200	260 / -250	380	0	0
4	7530	140 / -120	260	-380 / 1290	290 / -240	210 / -220	310	0	0
3	8530	160 / -140	300	-450 / 1530	430 / -330	250 / -250	340	0	0
2	11090	290 / -240	560	-740 / 2790	880 / -620	430 / -430	510	0	0

Reference distance is based on Max Manual Braking, sea level, standard day, no wind or slope, and no reverse thrust.

Reference distance includes a distance from threshold to touchdown associated with flare time of 7 seconds.

Distances are based on HYD PRESS L+R failure distances which conservatively approximate the effects of 5G interference.

Actual (unfactored) distances are shown.

Note: per procedure, Max Manual Braking is not required for normal operations and is to be used only in the event that significant 5G interference effects occur.

- En route:
 - Plan to use Flaps 30 and V_{REF30} (with appropriate wind additives) for landing.
 - For runway condition codes 6 to 2, compute time of arrival (en route) landing distance using Table 1 through 6, as applicable, applying all adjustments. Multiply the resulting unfactored landing distance by 1.15 to obtain the minimum required landing distance at the destination. This approximates a minimum required landing distance resulting from 5G C-Band interference.
 - Determine desired AUTOBRAKE setting by using the normal configuration landing distance information from an approved source. Maximum manual braking may not be required.
- During approach and landing:

- Monitor radio altimeter for anomalies.
- Normal use of autothrottles is allowed. Monitor performance of autopilot and autothrottle. If the autopilot or autothrottle is not performing as expected, disconnect both the autopilot and autothrottle and apply manual inputs to ensure proper control of flight path.
- If the autothrottle does not reduce the thrust to IDLE at 25 feet, manually reduce the thrust to idle, hold the thrust levers in the idle position and disconnect the autothrottle to prevent autothrottle from advancing the thrust levers after touchdown.
Caution: If the autothrottle advances the thrust levers after landing, the speedbrakes will stow and the autobrake will disarm. It will not be possible to raise the reverse thrust levers to deploy the thrust reversers until the thrust levers are at idle.
- Manual deployment of the speedbrakes may be required.
- If the thrust reversers do not deploy, immediately ensure the speedbrakes are extended, apply manual braking and modulate as required for the existing runway conditions.
Note: In some conditions, maximum manual braking may be required throughout the entire landing roll.

(i) New Requirement: AFM Revision for Non-Radio Altimeter Tolerant Airplanes

For non-radio altimeter tolerant airplanes, do the actions specified in paragraphs (i)(1) and (2) of this AD.

(1) On or before June 30, 2023, revise the Limitations Section of the existing AFM to include the information specified in figure 6 to paragraph (i) of this AD. This may be done by inserting a copy of figure 6 to paragraph (i) of this AD into the existing AFM. Incorporating the AFM revision required by this paragraph terminates the AFM revision required by paragraph (h)(1) of this AD.

(2) Before further flight after incorporating the limitations specified in figure 6 to paragraph (i) of this AD, remove the AFM revision required by paragraph (h)(1) of this AD.

Figure 6 to paragraph (i) – AFM Revision for Non-Radio Altimeter Tolerant Airplanes

(Required by AD 20-**-**)**

Radio Altimeter 5G C-Band Interference, Landing Distance

Due to the presence of 5G C-Band wireless broadband interference, when dispatching or releasing to or landing on runways in the contiguous U.S. airspace, the following limitations are required.

Minimum Equipment List (MEL)

Dispatch or release with any of the following MEL items is prohibited:

- 32-42-02 – Antiskid Control Systems
- 32-45-01 – Wheel Brake Systems
- 32-45-01-01 – Wheel Brake Systems, Electric Brake Actuator Systems

Landing Operations on Runways with Condition Code 1 or 0

Dispatch or releasing to or landing on runways with a runway condition code of 1 or 0 is prohibited.

Landing Distance Calculations for Runway Condition Codes 6 through 2

Operators must follow the 5G C-Band Interference Landing Distance Procedure contained in the Operating Procedures Section of this AFM.

(j) New Requirement: AFM Revision for Radio Altimeter Tolerant Airplanes

For radio altimeter tolerant airplanes, do the actions specified in paragraphs (j)(1) and (2) of this AD.

(1) On or before June 30, 2023, revise the Limitations Section of the existing AFM to include the information specified in figure 7 to paragraph (j) of this AD. This may be done by inserting a copy of figure 7 to paragraph (j) of this AD into the existing AFM. Incorporating the AFM revision required by this paragraph terminates the AFM revision required by paragraph (h)(1) of this AD.

(2) Before further flight after incorporating the limitations specified in figure 7 to paragraph (j) of this AD, remove the AFM revision required by paragraph (h)(1) of this AD.

Figure 7 to paragraph (j) – AFM Revision for Radio Altimeter Tolerant Airplanes

(Required by AD 20-**-**)**

Radio Altimeter 5G C-Band Interference, Landing Distance

Due to the presence of 5G C-Band wireless broadband interference, when dispatching or releasing to or landing on runways in the contiguous U.S. airspace, the following limitations are required unless operating at a 5G C-Band mitigated airport as identified in an FAA *Domestic Notice*.

Minimum Equipment List (MEL)

Dispatch or release with any of the following MEL items is prohibited:

- 32-42-02 – Antiskid Control Systems
- 32-45-01 – Wheel Brake Systems
- 32-45-01-01 – Wheel Brake Systems, Electric Brake Actuator Systems

Landing Operations on Runways with Condition Code 1 or 0

Dispatch or releasing to or landing on runways with a runway condition code of 1 or 0 is prohibited.

Landing Distance Calculations for Runway Condition Codes 6 through 2

Operators must follow the 5G C-Band Interference Landing Distance Procedure contained in the Operating Procedures Section of this AFM.

(k) Alternative Methods of Compliance (AMOCs)

(1) The Manager, Operational Safety Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or responsible Flight Standards Office, as appropriate. If sending information directly to the manager of the Operational Safety Branch, send it to the attention of the person identified in paragraph (m) of this AD. Information may be emailed to: AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the responsible Flight Standards Office.

(3) AMOCs approved for AD 2021-23-12, Amendment 39-21810 (86 FR 69984, December 9, 2021) providing relief for specific radio altimeter installations are approved as AMOCs for the requirements specified in paragraph (h) of this AD until June 30, 2023.

(l) Related Information

For more information about this AD, contact Brett Portwood, Continued
Operational Safety Technical Advisor, COS Program Management Section, Operational
Safety Branch, FAA, 3960 Paramount Boulevard, Lakewood, CA 90712-4137; phone:
817-222-5390; email: operationalsafety@faa.gov.

(m) Material Incorporated by Reference

None.

Issued on April 28, 2023.

Michael Linegang, Acting Director,
Compliance & Airworthiness Division,
Aircraft Certification Service.

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